

## Chemistry 250 (2 credit) Instrument Proficiency for Scientists - UV/Vis Spectroscopy Spring 2021

Operated as an Independent Study with times arranged

Initial, organizational meeting will be during the first week of classes at a mutually agreeable time arranged via email.

### Instructor

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### Class schedule

Work will be centered around the Shimadzu UV-2450 UV-Vis Spectrometer, TCC Temperature Controller, and the ISR-2000 Integrating Sphere Attachment.

Wet lab work: 2-3 hours per week, specifically scheduled with the instructor to coordinate schedules and avoid conflicts for time on the instruments.

Permissible unscheduled work (not wet lab): computer, literature, writing reports.

Principal locations of course work: FSC 350 and FSC 312

Regular attendance is expected.

Work in groups of two is permitted and encouraged.

### Supplies

Safety goggles (wear them consistently in lab work).

Permanently bound lab notebook with carbon/carbonless pages. It can be a continuation of a notebook used for another course.

### Course description

Each offering enables students to develop a solid foundation in the theoretical aspects and operating principles, as well as develop hands-on proficiency in the operation of the featured instrument and interpretation of the data. UV-Vis Corequisite: Chem 202.

### Student Outcomes

Students will be able to:

- ❖ For a C
  - Start up the spectrometer and set up a method.
  - Choose the appropriate cuvette for an analysis.
  - Monitor the lamp times and intensities.
  - Operate the temperature controller.
  - Select an appropriate scan rate and slit width.
- ❖ For a B
  - Obtain spectra for transparent solids and solutions.
  - Correlate absorbance peaks with the chemical behavior of the sample.
  - Determine the effect of pH on an acid-base indicator spectrum.
- ❖ For an A
  - Install and remove the solid state reflectance accessory.
  - Set up a reflectance method.
  - Prepare BaSO<sub>4</sub> reference and sample trays.
  - Choose an appropriate white reference for an analysis.
  - Make appropriate corrections on reflectance spectra to allow direct comparison to absorbance spectra.
  - Evaluate the composition of a solid acid-base indicator.
  - Obtain a reflectance spectrum on an opaque sample.

### Canvas

The syllabus and other handouts for this class will be posted on Canvas under **Instrument Proficiency for Scien A CHEM 250 Spring 2021**. You are automatically enrolled when you register for this course. **This is my first time using Canvas, so let me know if you encounter problems. We will learn to navigate this together.** An Overview of Canvas for Chem 250 will be emailed to all students prior to the beginning of the course to help you get started. Briefly:

- 1) The **Home Page** for this course is **Modules View**.
  - a) Expand the module for your instrument and collapse the others.
  - b) All handouts, assignments, and resources will be visible.
  - c) Click on one to open it.

- 2) **Discussion** gives you an opportunity to interact with other students taking this course but participation is NOT required.
- 3) The **Grade Book** allows you track assignment completion, but does not show any grades.
- 4) Everything except notebook pages will be submitted in Canvas as **Assignments**. No paper copies are required for Reports.
  - a) Feedback will be provided electronically through Canvas.
  - b) Insert an Honor Pledge in each Report. A copy of the Honor Pledge will be posted on Canvas.
  - c) Email the instructor when you have made a submission so I know there is one to grade.
  - d) Submissions must be in one of these formats: Word, Excel, pdf.
  - e) Canvas accepts only one file per assignment. Make sure you compile each report as one document.
  - f) You can submit an unlimited number of times. Each new submission replaces the previous one.

## COURSE POLICIES

### Deadline

Submit reports and documentation of completed projects as you finish them; **don't** wait until the end of the term to submit everything. Completion of all work and submission of reports is **Friday, Nov. 29**. In place of a final exam, the class will meet during the last week of classes (date and time tbd) to share experiences. Come prepared to share/compare the results of your projects.

### Safety

- 1) Ordinarily students are not allowed to work alone in the lab. However, this course is structured as an independent study with minimized risks, so you will be allowed to work alone in the lab. It is imperative that you work only when the instructor is available (scheduled times or by special arrangement).
- 2) A review of Lab Safety is required for all Chemistry lab courses. To satisfy this requirement, a Chem 250 Safety Review document is posted on Canvas and a Chem 250 Safety Review Quiz (on Canvas) will document your completion of this requirement.
- 3) Work on a Project **MUST NOT** proceed until your Safety Report for that Project is APPROVED.
- 4) If you have asthma, allergies, are pregnant, or have other special circumstances, please inform your lab instructor so we can plan appropriate accommodations for your safety.

### Grading

Criteria for grades of C, B, and A are outlined below. Plus/minus grades will be determined by the quality of the work submitted.

#### To earn a grade of C:

- 1) Read the Chem 250 Safety Review and submit the Chem 250 Safety Review Quiz.
- 2) Each **person** maintain a current and satisfactory laboratory notebook.
  - a) Turn in notebook carbon pages each week (on instructor's desk).
- 3) Be present in lab each week.
- 4) Do UV-Vis Project for a C provided as a handout.

#### To earn a grade of B - requirements for a C, plus:

- 5) Do UV-Vis Project for a B provided as a handout.
- 6) Compile a list of corrections and suggested modifications for the UV-Vis operations manuals. Submit an electronic copy to Moodle following Moodle criteria above. The format of your list is not critical; your comments will be incorporated into a revision of the manual.

#### To earn an A - requirements for a C and a B, plus:

- 7) Do UV-Vis Project for an A provided as a handout.
- 8) Compile a list of corrections and suggested modifications for the Temperature Control and SSR operations manuals. Submit an electronic copy to Moodle following Moodle criteria above. The format of your list is not critical; your comments will be incorporated into a revision of the manual.

### Resources (no texts to purchase)

Use these resources in place. **Do not remove them except briefly (half hour or less) to make copies in Mikkelsen Library!**

- 1) Variety of manuals for the UV-Vis on the UV-Vis computer.

- 2) Ronald C. Denny and Roy Sinclair, *Visible and Ultraviolet Spectroscopy*, Analytical Chemistry by Open Learning, John Wiley, New York, 1987. (QD96 .A2 D47 1987 - FSC 312 Computer Lab).
- 3) <http://www.asdlib.org> Dr. Weisshaar's Courses Home Page at URL <http://faculty.augie.edu/~dew> and associated links.
- 4) Analytical Sciences Digital Library <http://asdlib.org/> - a peer-reviewed digital library for the analytical sciences.
- 5) *J. Chem. Ed.* searchable index on the web at URL <http://data.jche.divched.org/~cesearch/index.php> (link provided on the course web site).
- 6) Chemistry 311 materials in Computer Lab FSC 312.
  - a) Lab and Writing Resources - experimental procedures.
  - b) Articles on Instrumental Methods.
  - c) Analysis and Instrumental Methods texts and lab manuals.
- 7) Do your own search for others, include SciFinder. Share good links with your instructor.

## UNIVERSITY POLICIES

### Accessibility

Augustana welcomes students with disabilities to participate in all of its courses, programs, services, and activities. If you have a documented disability and are requesting accommodations, please contact Susan Bies, Director of Accessibility and Academic Support. Her office is located in the Student Success Center (Edith Mortenson Center, Suite 100) and she may be reached at 605-274-5503 or [susan.bies@augie.edu](mailto:susan.bies@augie.edu).

### Honor Code

As a community of scholars, the students and faculty at Augustana University commit to the highest standards of excellence by mutually embracing an Honor Code. The Honor Code requires that examinations and selected assignments contain the following pledge statement which students are expected to sign:

“On my honor, I pledge that I have upheld the Honor Code, that the work I have done on this assignment has been honest, and that the work of others in this class has, to the best of my knowledge, been honest as well.”

Faculty members are responsible for investigating all instances involving any student who does not sign the Honor Pledge or who bring forward an academic integrity concern. The complete Honor Code can be found at [www.augie.edu/honor](http://www.augie.edu/honor).

What does this mean in this course?

- You do your own work on individual assignments (not copying others). On group assignments you contribute to the group effort and strive to understand all parts of the project, not just the part you do.
- In lab you are “true” to your data - your report reflects what *you* measured and observed; data is not changed or manufactured to fit expectations. If you missed collecting some data, see the instructor; don't copy someone else's data.
- Give credit where credit is due. When you gather data from the Web, books, magazines, etc. cite the reference (author, title, etc.).

I presume we are in this class to help each other learn some chemistry (yes, instructors learn in this class too), so I trust you to turn in work that reflects your efforts and also, that as individuals and in your small groups, to help each other adhere to the **Honor Code**. The above statement *should be added to one file in each submission set*.

If you cannot, in good conscience, sign this pledge or if you have other concerns about academic integrity in this course, please come visit with me (in confidence of course) or send me an e-mail note. At a minimum, students caught violating this code will receive a zero (0) on the assignment or exam and the incident will be reported to the Academic Dean in accordance with the **Honor Code** procedures.

### Commitment to Preventing Discrimination and Sexual Harassment

Augustana University is committed to creating and fostering a learning and working environment based on open communication and mutual respect. This is an integral part of the academic mission to enrich our students' educational experiences and prepare them to live in and contribute to a global society. If you encounter sexual harassment, sexual misconduct, sexual assault, or discrimination please contact the Title IX Coordinator at 605-274-4044 or [belam@augie.edu](mailto:belam@augie.edu). If you make a report of this nature to a faculty member, they must notify the Title IX Coordinator about the basic facts of the incident (you may choose whether you or anyone involved is identified by name). For more information about options at Augustana, please visit [www.augie.edu/titleix](http://www.augie.edu/titleix).

### Turnitin

Turnitin is an originality detection service. Its use in this class is both to prevent plagiarism and to help the student improve his or her writing. Turnitin.com compares a document with its extensive database of submitted papers, published works, and documents from the internet. Turnitin issues a “similarity score.” Your instructor will review the similarity report and make any determinations about any improper citations, missing citations, or plagiarism. Student papers will be retained in the global Turnitin repository for future comparisons.

**Safety Statement**

Augustana University seeks to provide in-person instruction wherever feasible and reasonably safe. To that end, classrooms have been reconfigured to implement physical distancing guidelines, strict disinfection protocols have been developed, and masks are now required in academic buildings. For the safety of everyone in our community, in particular those at high risk of complications from COVID-19, and with the desire to remain on campus for the duration of the semester, we must all strive to meet the expectations of the Viking Flex Health & Safety Pledge, signed by students prior to fall semester.

**Student Engagement and Mask Policy**

To attend and participate face to face in this class, you must check yourself for symptoms daily, and bring and wear a mask that covers your nose and mouth. You will not be admitted to the classroom without wearing one. As a member of the Augustana community, which values care for one another and our environments, we all have a personal role to play in keeping our community healthy and safe. Augustana University and your faculty have established protocols and guidelines for not only your own protection, but also for the health and safety of those who teach you, learn alongside you, live in community with you, and serve you. The current recommendations from leading health organizations is that wearing a mask that covers your nose and mouth will help prevent the spread of COVID-19.